

ABSTRACT

A method of growing single crystal Gallium Nitride on silicon substrate is disclosed including: removing oxide layer of silicon substrate, growing buffer layer of Silicon Carbon Nitride (SiCN),
5 and growing single crystalline Gallium Nitride thin film, characterized in that a buffer layer of SiCN is grown to avoid lattice mismatch which appears when Gallium Nitride is grown directly on silicon substrate, and that Rapid Thermal Chemical Vapor Deposition is adopted to grow SiCN buffer layer, and
10 that Metalorganic Chemical Vapor Deposition is adopted to grow single crystalline GaN thin film. The method of present invention has advantages:

- (a) eliminating lattice mismatch between GaN and Si effectively,
- (b) taking the place of sapphire substrate which has high lattice
15 mismatch, and SiC substrate which is expensive,
- (c) integrating with maturely-developed, cheap silicon semiconductor industry,
- (d) being compatible with VLSI technology,
- (e) being fabricated in large area substrate,
- 20 (f) no need of isolated etching,
- (g) smaller dimension of each unit GaN element,
- (h) convenience to fabricate vertical-structured LED or LD element,
- (i) promoting GaN elements quality,
- 25 (j) increasing yield

(k) reducing manufacturing cost,